III-E. General Equipment Accounts

The General Equipment Account price indexes measure the change in the prices of computers, furniture, motor vehicles, other work equipment, and other items listed below. The composition of the General Equipment Accounts was left essentially unchanged by the USOA revisions. The General Equipment Indexes, with the exception of Account 2123.2 - Other Communication Equipment, are moved with Producer Price Indexes (PPI) calculated by the Bureau of Labor Statistics. The price indexes used for that purpose are the ones that most closely approximate the composition of each general equipment account. The PPIs used to proxy the ASITPIs of the General Equipment Accounts are listed below.

TPI General Equipment Account		PPI Index	
2112	Motor Vehicles	141	Motor Vehicles & Equipment
*2113	Aircraft	1421-02	Civilian Aircraft
2115	Garage Work Equipment	35597	Mechanics' Hand Tools
		34231	Auto Maintenance Eq
2116	Other Work Equipment	112	Construction Machinery and Equipment
2122	Furniture	122	Commercial Furniture
2124	Computers	3674P	Semiconductors & Related Devices - Primary Products
2123.1	Office Support Equipment (formerly Office Machines)	1193	Office and Store Machines and Equipment

*New under Part 32

PPIs are issued each month for the previous month and revisions for the month 4 months prior to that. That means the June PPI release will show the initial May PPIs and the revised January PPIs. This is an important note because the most up-to-date number should be used in the index calculations. When calculating the TPI, we wait for the June PPI release so we can use the latest, most up-to-date information for the January 1 spot prices.

As stated earlier, Account 2123.2 - Other Communication Equipment, is the only General Equipment Account index not proxied with a PPI. The materials portion of that account is derived using quarterly prices from a regional database called "Purchase Order History - Capital Accounts by FRC." That database is the successor to the previously used PHARS database (Purchase History and Analysis Reporting System). The resulting index is also used as a proxy for the 2311-Station Apparatus account.

The items and associated prices used to derive the 2123.2 materials index are shown on the following pages. Because very few prices were available for the 1988 sample in 1989, a new sample of items was linked in at 4Q88.

III-F. Station Accounts

The Station Account is composed of four subaccounts - 2311-Station Apparatus; 2341 - Large PBX; 2362-Other Terminal Equipment; and 2351-Public Telephones. The expenditures on Station Apparatus and Large PBX are essentially zero. Accordingly, proxies are used to move the material portions of those accounts. Station Apparatus, composed historically of only materials, is moved with the materials index derived for 2123.2 - Other Communications Equipment. The source of those data is the Purchase Order History report. Large PBX is proxied with a composite of the subcomponents of the Circuit index. Other Terminal equipment, which supplanted the Large PBX index, is also moved with that composite of circuit materials. The prices for Public Phones materials index are also from the Purchase Order History database. As with the Other Communications Equipment account, the sample of items priced in

1988 was not valid in 1989; therefore, a new sample was selected in 1989 and those items were linked in at 4Q88.

III-G. Outside Plant Accounts

The Outside Plant accounts comprise Aerial Cable, Underground Cable, Buried Cable, Intrabuilding Network Cable, Conduit, and Poles. Each cable account is further divided to Copper and Fiber materials. The material items are taken from information found in the Purchase Order History report which list items purchased in each of the capital accounts by FRC. The computation of the material indexes follows the methodology used for the COE accounts. Specifically, a Fisher's Ideal is computed for the materials purchased for the accounts in much the same way as it is for the COE material price index.

III-H. Contractor Services

Ameritech contracts with outside vendors for the provision of certain goods and services. In the central office environment, those services could include installing a switch. In the outside plant environment, it could be burying fiber cable. The methods used for measuring the price change of these services are, accordingly, different by type of account.

III-H.1. Central Office Accounts Contractor Services

In the Central Office accounts, as in the past, contractor services are treated as an overhead or "loading" to the purchase of materials. The effect of this procedure is to alter the materials price index by the extent to which expenditures on labor and engineering increase at a faster or slower rate than expenditures on materials. That altered material index is what we refer to as the "loaded material index."

The loadings are developed by account. For those accounts that price dying technology, a "universal" load factor is also calculated. That is done because the load factors calculated in the Step-by-Step, Crossbar, and Analog ESS accounts are very volatile; using a load factor reflecting the aggregate movement of the COE accounts is much more representative.

The dollar expenditures on which the loadings are based are from the Budget Management Reports. The formula for deriving the load factor is:

$$\frac{(1 + (CS_t \ / \ M_t))}{(1 + (CS_{t-1} \ / \ M_{t-1}))} = \text{Load Factor}$$

where t=current year
t-1=previous year
CS = dollars spent on contractor services
M = dollars spent on materials purchases

The load factor is then multiplied by the average year to average year rate of change in the corresponding materials index. That loaded rate of change is then used to derive the relevant year's loaded materials index.

III-H.2. Outside Plant Accounts and Station Accounts

The methodology used to develop the contractor series for the outside plant accounts is essentially unchanged from earlier years. For the Buried Cable and conduit accounts, we continue to use the model developed for the 1986 and 1987 ASITPI. Likewise, the buried cable model continues to serve as a proxy for underground cable. Other, smaller models are used for the Poles, Aerial Cable, and Public Phones contractor series.

III-I. Telco Labor and Telco Engineering Costs

Price indexes are calculated for three major labor groups: central office labor, outside plant labor, and engineering. As in the past years, the employee census reports are used to calculate the "pure" wage change. The overhead loadings, however, are now calculated using information from the Budget Management Report. That is because older reports known as the SN-908 and QR 19 reports used to calculate the overhead loadings in the past ceased to exist under the Part 32 rewrite. The overhead loadings, when combined with the "pure" wage change, yield a wage index that reflects the rate of change in total compensation.

The "pure" wage change is calculated in the same manner as in previous years. A recap of that methodology follows:

Data by labor type for each state in Ameritech's region (Illinois, Indiana, Michigan, Ohio, and Wisconsin) are gathered as of 12/31 of each year. The information included on those reports is, by labor type, years of service, number of employees per year of service, and the associated average weekly wage per year of service. To calculate the average year to average year rate of change in labor, the 12/31 reports needed are for the previous year (call that t - 1), the year before that (call that t - 2), and the current year (call it t). Then the wage change from t - 2 to t - 1 is computed and the wage change from t - 1 to t is computed. Indexes are formed from the wage change and the t - 1 to t index is then averaged to represent the wage index for year t.

The 12/31 indexes by labor type are developed as follows: For each labor type, wages are sorted into tenure groups (years of services) and an average wage is computed for each tenure group. Price relatives are then formed for each tenure group. The resulting price relatives are then weighted by the total weekly wage (number of employees in the tenure group times the average weekly wage for the group). The sum of the weighted price relatives indicates, on average, how much the wages have changed from 12/31 of the previous year to 12/31 of the current year.

After the wage indexes have been computed and linked to the previous year's index (so they are in effect in prices of the base year 1988=100) the overhead loadings are developed. The overheads represent benefits, supervisory costs to oversee craft and engineering labor, and includes tools. When the overhead loadings and wage indexes above are combined, the resulting price relatives are used to derive the price indexes for labor and engineering in the ASITPI.

The overhead loadings are based on the ratio of overheads divided by wages in the current and prior ASITPI years. The loading itself is one plus the ratio of the current year divided by one plus the ratio of the previous year. After the loadings have been computed, they are applied to their corresponding average year to average year wage changes to yield the "loaded wage change" from year to year.

That current methodology for deriving the data for the overheads involves the use of the Budget Management Reports (BMRs). The BMRs classify how the expenditures in each account are allocated. Within those expenditures designated as being associated with labor and engineering, there are certain expenditure type codes that represent overheads such as leave, payroll taxes, benefits, and other indirect administrative costs such as supervision. The EXTCs remaining are designated as wages.

III-J. Expenditure Weights

Subaccount weights are generally updated every few years. In 1988, with the introduction of the new Part 32 accounts and the change in the capitalization of some of the labor overheads, the weights for the materials, telco labor, telco engineering and contractor services in each subaccount were recalculated. In 1990, in order to capture the shifting expenditure trends from copper to fiber cable and analog to digital or digital to fiber optic technology in the COE accounts, the weights were again updated. The following is a description of how the subaccount weights are developed.

III-J.1. Subaccount Weights

After the individual indexes for each subaccount are calculated, they are weighted together to derive the subaccount composite. Weights are developed for each part of the subaccount - materials, loaded materials (central office accounts only), telco labor, telco engineering, and contractor services. The weight for each component is based on the portion of total dollars spent on that item in that subaccount. The report used to develop the component weights by sub-account is called the Budget Management Report (BMRA44). It lists, by Expenditure Type Code (EXTC), how the dollars are spent in each subaccount. The EXTCs of the BMR used to develop total expenditures are allocated to one of the above components based on the description of the EXTC. Examples of EXTCs are: EXTC 523: "Material Purchases;" EXTC 481: "Contractor Service Labor and Inseparable Costs." The description of each EXTC can be found in the Financial Code Hierarchies and Statistics.

After the EXTCs have been allocated to the above components, they are totaled for each subaccount. Because the BMRs are not available at an aggregate company level, expenditures are first coded and aggregated by state. The state totals are then aggregated to a total company level.

With the component expenditures in each subaccount, the weights and composites can be calculated. Because the reference base, as well as the weight base, of the index was changed in 1988, the procedure for calculating the subaccount composite is rather laborious. Because the weight base was changed from 1977=100 to 1988=100, all of the historical weights, component indexes and subaccount composites had to be restated and/or recalculated. That procedure is discussed in general terms below.

1) The 1988 index levels based to 1977=100 were first calculated for each component (material, telco labor, telco engineering, contractor services).

2) The component indexes were thus rebased to 1988=100; that is, each year's index level (1946-1988) based to 1977=100 is divided by its corresponding 1988 level based to 1977=100 and multiplied by 100.

3) The weights used for years prior to 1988 that were calculated in 1977 constant dollars were then now restated to 1988 constant dollars.

4) The Link Factor and composite index are then calculated.

The link factor is calculated each time there is a weight change so that the change in the weights does not affect the change in the price index; the index should reflect only the change in prices. The method for estimating the link factor is described in II-D.

As stated earlier, the weights were also updated in 1990 to reflect continuing shifts from copper to fiber cable and to capture the declining expenditures in the technologically obsolete central office accounts. The weights derived from those expenditures must be restated to 1988 constant dollars. That is done by the method of re-referencing described in II-C.

III-J.2. Deriving the All Accounts Composite

The expenditures used to develop the All Accounts, Central Office, Station, and Outside Plant Composites (among others) are taken from the MR (Monthly Report)-21 for December of each year. The composites are calculated in the same way as the subaccount composites. The composite weights are updated whenever the subaccount weights are updated.

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Documentation of Ameritech TPI Forecasting Procedures

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Forecasting of the Ameritech Telephone Plant Indexes

History

AT&T began forecasting the Bell System Telephone Plant Index (the precursor to the current Ameritech Telephone Plant Index) in 1974. The methodology used at that time was to correlate components of the BSTPI with major price indexes published by the federal government that moved similarly to the components. Forecasts of the government series could then be used to proxy percent changes in the BSTPI composites.

In late 1978, Joel Popkin and Company began revising the methodology that AT&T was using to forecast the BSTPI. The revised methodology involved splitting the BSTPI for each account and subaccount into two main groups: 1) labor and 2) materials. Secondly, econometric techniques were used in the forecasting process to estimate structural relationships between the labor and materials components of the BSTPI and aggregate macroeconomic explanatory variables.

General Methodology for Forecasting the Ameritech TPIs

Joel Popkin and Company uses a variation of the general methodology it recommended to AT&T to forecast the Ameritech TPIs (ASITPI). The method uses econometric techniques to establish a mathematical relationship between the historical movement in each of the labor and materials components that make up the ASITPI and the historical movement in the explanatory variables. The explanatory variables are usually aggregate measures of the U.S. economy, such as the growth of real output, price indexes from the national income and product accounts, wage rates for the U.S. as a whole, as well as materials prices such as copper prices and the price of PVC plastic. However, Ameritech's subscriber line growth is used in some instances as an indicator of Ameritech's network expansion.

What the econometric techniques provide is a systematic, quantifiable statement of what has happened in the past. Use of those relationships to forecast the future changes in the TPIs implicitly makes the assumption that history will more or less repeat itself. Much of the time it does. However, special circumstances can always arise which make the future outcome different from what history would predict.

Consequently, while the equations in the model are a good starting point for forecasting the TPIs, the numbers produced by the model must be reviewed in the context of all the other information that is known. That includes specific information about Ameritech contracts, escalation clauses and union agreements as well as more general information about network plans and phase out schedules for older equipment.

The Mathematical Model

Equations are estimated separately for the materials and labor indexes that make up each of the composite indexes in the TPI[1]. Each of the composite indexes has a specific materials index associated with it. However, the same labor index may be used in several different composite indexes; for example, engineering labor is used in almost all the accounts. Therefore, only one equation is necessary for each type of labor.

For the most part, ordinary least squares regression techniques are used to relate the historical percentage changes in the labor or materials indexes to the historical percentage changes in the explanatory variables. The resulting coefficients quantify the historical relationships between the data.

Since none of these relationships use other TPI components as explanatory variables, and since there are no cases where estimates must be determined simultaneously, the econometric relationships can then be used in a LOTUS file to calculate the forecasted percentage changes for each index. If there was some simultaneity in the system, it would be necessary to use a more complex algorithm to make the forecasts. However, this model is mathematically simple enough to be used in this manner.

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[1]Composite indexes that are weighted averages of material and labor cost changes are produced for each account of the FCC's Part 32 Uniform System of Accounts and where there is enough information to produce them, there are indexes for selected subaccounts.

It is never expected that the explanatory variables chosen will predict perfectly any component of the ASITPI. It is very rare when mathematical relationships such as these statistically explain close to 100 percent of any variable's historical movement, let alone its future movement. The corrected R-squared statistic measures the percent of variance in the TPI component that can be accounted for by the behavior of the explanatory variables in the estimated relationship. The R-squared statistics in this model range from about 35% to about 95%. The very low values are generally due to the fact that percentage changes of the TPI components are much more volatile than percentage changes of the more aggregate economic measures being used to explain them. In some cases it was necessary to insert special "dummy" variables in the equations to explain particularly large deviations in the TPI component in particular years. Those dummies were put in so that the very few large and sometimes unexplainable annual percentage changes did not bias the estimate of the general relationship between the labor or materials index and the explanatory variables. Dummy variables, therefore, operate as proxies for information not known that needs to be represented in the relationship or to approximate known effects, like a technological breakthrough, that are not continuous through time. They may also stand in for influences that are known but not easily quantified. An example of that sort of dummy variable is the one used to measure the impact of the implementation of FAS 106 rules on the wage equations.

The Ameritech equations are based on a few explanatory variables that have been shown to have some systematic impact on the various components of the ASITPI. The model has been kept relatively simple because of its long-term nature. Forecasts are usually done for about a decade at a time. The data used as explanatory variables need to be relatively widely used and forecast, thus enabling the company to provide its own assumptions about them if it wishes. The explanatory variables used are:

The GDP chain price index;
the chain price index for nonresidential structures;
the producer price index for capital equipment;
the producer price index for domestic copper cathode;
the producer price index for polyvinyl chloride;
the employment cost index for union wages;
Ameritech subscriber line growth; and,
changes in the employment growth at Ameritech.

The equations for the various component labor indexes are almost all of the same form. The explanatory variable used is the employment cost index for union wages. Two major factors affect the fit of the equations. The first is that the terms of telephone unions' contracts obviously differ somewhat from the wage settlements across the whole U.S. However, wage changes of significant groups of workers have tended to remain in line for long periods with workers as a whole. Therefore, it is logical that as a broad measure, U.S. union wages will explain a large part of Telco wage movements.

The other major factor affecting the equation fit is the composition of the labor indexes that are part of the TPI. The TPI labor indexes measure changes not only in wages but also in fringe benefits and overhead costs associated with labor. Historically, the overhead costs have varied quite a lot making the percentage changes in the loaded labor numbers used in the indexes quite volatile. One reason for the change in overhead costs over recent years is the downsizing of Ameritech's workforce. That has changed the amount of supervisory and support overheads associated with the direct labor used to install plant. The percent change in the Ameritech workforce has been used as a proxy for some of those changes. However, that has operated as only a partial explanation for changes in the overhead costs, there remains some unexplained movement that tends to worsen the fit of the labor equations.

There is no one general variable that can be used to predict the materials indexes. Each major materials price index reflects different supply and demand conditions in the market in which it is purchased. For example, the metallic cable accounts are influenced by copper prices and construction costs while the switching components are heavily influenced by the introduction of new technology and competition among suppliers. Thus, it was necessary to use different variables to explain the movement of each of the materials indexes.

The cable materials equations cover only copper cable. Fiber optics is still a relatively new technology and its price movements are largely determined by the learning curve and specific market relationships rather than by material inputs. Consequently, an econometric equation does not capture the appropriate price determining relationships. The copper cable materials indexes use as their explanatory variables copper prices and the chain price index for nonresidential structures which reflects construction costs. The supply and demand relationships in the metallic cable markets as a whole are often influenced by the cycle in the construction industry. Consequently, this price index provides a better proxy for some of those market influences than does the more general price index for all of GDP.

The equations for the COE materials indexes are developed using the GDP chain price index, reflecting prices of all of U.S. output, or from the materials' own price, lagged one period. This tends to establish a trend line for these price changes. Another explanatory variable used to explain prices of digital ESS and digital circuit materials is growth in customer lines. Its relationship, turns out to be negative, i.e., as line growth increases, digital ESS and digital circuit prices fall. This reflects the effect of technological change in these two areas. As companies learn more about new products, they improve the technologies used to produce them and also use mass production techniques. That usually causes the unit cost of production to decline. Growth in the economy and in the BOCs networks usually provides a market for those products large enough to make it cost effective to introduce the newest technologies and mass produce them at the lower cost. It also reflects the tendency of the BOCs to receive bulk discounts as their purchases of specific network elements increase.

The general equipment accounts (furniture, office machines, computers, vehicles and work equipment) are not based on actual Ameritech data. Their movement is determined by selected BLS Producer Price Indexes. The equations to explain vehicles, work equipment and office machines use the PPI for capital equipment as the explanatory variable. Since the relationship between the price of machinery and equipment, in general, moves similarly to specific equipment costs, the equations explain the historical movement of the TPI indexes quite well. Furniture prices which do not move like machinery prices are explained by the more general chain price index for GDP.

The equation used to forecast the buildings index uses the deflator for nonresidential structures which reflects general construction costs and the PPI for capital equipment, which reflects specific equipment prices used in the calculation of the buildings index.

Forecasting Procedures

The econometric equations are used as the basis for the forecast. The percentage changes of the forecasted explanatory variables are used as inputs to the equations. The results are forecasts of percentage changes in the labor and materials indexes that make up the ASITPI account composites. Those percentage changes represent the long-term relationships between the component indexes and the explanatory variables.

However, the percentage changes forecasted with the model are not the final forecast. The results must be evaluated using information that cannot be directly quantified in the equations. If that information indicates it is necessary, additional modifications are made to the forecast values produced by the model. Therefore, the final forecasted values are a mixture of equation produced numbers and judgmental modifications to them. The judgmental forecasts are especially important for the equipment incorporating the newest technology.

Most often the use of the additional information affects the first year or two of the forecast. Often information about at least first-of-year prices is known, and at times there may be information about other price changes during the year. Outside information about suppliers' behavior and union contract provisions can also be used to increase the accuracy of the forecasts. Along with data that come from Ameritech itself, government data sources can also be looked at. The furniture and general equipment accounts of the ASITPI are based on government producer price indexes. Those are released each month with data for the previous month. Therefore, it is useful to compare the forecasted values from the equations with the year-to-date information. This can give a much more accurate estimate than the equation alone.

The econometric approach, even when modified by judgment, cannot be used to forecast prices of all of the complex capital equipment included in the TPI. A case in point is the prediction of the price of fiber optic cable. Fiber optic cable prices are not heavily influenced by the prices of the glass and chemicals used to produce the cables but are influenced by technological improvements that have driven down unit costs (learning curve effects) and the supply and demand situation in the industry. An econometric relationship estimated for such a rapidly changing technology generally does not produce an accurate long-term forecast. In such cases, a purely judgmental forecast is produced based on an evaluation of the current situation in the industry and any changes that are expected to take place. Of course, with any new technology there can be major breakthroughs or unexpected problems. Therefore, the amplitude of changes in a judgmental forecast price is likely to exceed that of prices for a more established product.

The forecast of the price indexes for digital ESS equipment and digital circuit equipment are also usually determined by judgmental adjustments. While equations do exist for these materials, their outcome is rarely the final number used in the forecast. The digital switch market has become very competitive. Short-run price changes for digital switches tend to reflect marketing strategies of their producers more than changes in production costs and the volume discounts negotiated by Ameritech for particularly large purchases. In the most recent years, long-term agreements have been entered into for the large numbers of digital switches that were being installed to replace the older electromechanical and analog SPC switches. Therefore, adjustments have been made to the numbers forecast by the equation to bring them into line with what is judgmentally predicted based on an evaluation of the current market conditions for digital switches and Ameritech's latest contracts.

The digital circuit account is another account where technological change must be carefully considered. The circuit account, especially the non-SPG portion of it, is an aggregation of many different types of equipment. The rapid change in the makeup of the equipment in the digital circuit accounts makes a forecast based on historical relationships alone somewhat suspect. The equation results are examined in light of what is known about the expected purchase of new types of equipment and the phase out of older equipment and adjusted accordingly. In particular, the price trends for equipment that is being phased out are given less weight in the forecast period than the price trends for the equipment that is being phased in.

Once final forecasts have been produced for each of the labor and materials indexes, the forecasts of the composite indexes can be produced. The ASITPI labor and materials forecasts are weighted using the latest available weights from the historical TPI (currently 1993) to form the subaccount composites which are in turn weighted to form the major account composites, such as the COE and Outside Plant indexes, and the total TPI.

Capital Trend Rate

Forecasts of the ASITPI are generally prepared about nine years into the future. For uses requiring longer projections, a trend rate is also calculated. The trend rate is developed by analyzing the forecasted values for the most distant five years of the forecasting horizon. In most cases, the modal value (that is the value observed most frequently) is selected as the trend rate. If a clear trend is present in the five-year period, judgment is used to determine if that trend should be projected into the future or if the modal rate should be used. In addition, if there is reason to believe that long-term technological change is occurring, then that is also considered when determining the trend rate. Of course, the further into the future the forecast applies, the larger the forecast error is likely to be. For the periods for which the trend rate is used, many unforeseen factors could influence the actual outcome of the cost increases.

APPENDIX 1: Ameritech Telephone Plant Index
February 1997 Forecasting Equations and Explanatory Variables

Materials Equations*

- Poles - POLEM
- Aerial Copper Cable - ARCABM
- Buried Copper Cable - BRCABM
- Underground Copper Cable - UGCABM
- Intrabuilding Network Copper Cable - IBNCABM
- Underground Conduit - UGCONM
- COE Radio - RDCOEM
- COE Digital ESS - ELCOEM
- COE Analog ESS - ELACOEM
- COE Analog Circuit - ANACIRC
- COE Digital Circuit - DIGCIRC
- COE SPG Circuit - SPGCIRC
- Public Phones - PUBTELC
- Other Terminal Equipment - OTERMEQ
- Station Apparatus - STAPP
- Other Communications Equipment - TSUNIT
- Vehicles - VEHCM
- Work Equipment - WKEQM
- Garage Work Equipment - GWKEQM
- Furniture - FURNM
- Computers - COMPM
- Office Support Equipment - OFFSUPEQ
- Buildings - BLDGC

Labor Equations*

- Telco COE -TELCOE
- Telco Engineering - TELENG
- Telco OSP - TELPSP
- Telco Installation - TELINST
- Contract Poles - CLPOLE
- Contract Cable - CLCAB
- Contract Conduit - CLCON
- Contract Public Phones - CLPTEL

Explanatory Variables*

- Chain price index, Nonresidential Structures[1] - IPDNRS
- Chain price index, GDP[1] - IPDGDP
- Capital Equipment PPI[2] - PPICAP
- Copper PPI[2]- COPPNS
- PVC PPI[2] - PVC
- Union Wages[3]- WAGEU
- Subscriber Lines [4]-CUSTLINE
- Ameritech employee counts [4]- PCEMPS

*Percent changes of annual averages.
[1]National Income and Product Accounts, Table 7.1. BEA, Department of Commerce.
[2]Producer Price Indexes, Tables 1,5 and 6. BLS, Department of Labor.
[3]Calculated from the Employment Cost Index for union wages, Table 7. BLS, Department of Labor.
[4]Ameritech annual reports

Materials Equations

6. Underground Conduit

$$UGCONM = -.030 + \underset{(1.6)}{.561} \times IPDNRS + \underset{(3.9)}{.514} \times PVC + \underset{(4.3)}{.127} \times DUMCON^{*}$$

R-squared: .747 Corrected R-squared: .683
Std. error of est.: .051 Period of fit: 1980-1995
Dummy for 1984,1985,1994

11. COE Digital Circuit

$$DIGCIRC = .029 + \underset{(6.5)}{.670} \times DIGCIRC(-1) - \underset{(2.2)}{1.01} \times CSTLINE + \underset{(9.2)}{.127} \times DUMDCRM^{*}$$

R-squared: .932 Corrected R-squared: .912
Std. error of est.: .017 Period of fit: 1982-1995
*Dummy for 1986, 1987

22. Buildings

$$BLDGC = .016 + \underset{(2.8)}{.358} \times CAPNRS + \underset{(2.6)}{.310} \times CAPNRS(-1)$$

R-squared: .834 Corrected R-squared: .808
Std. error of est.: .011 Period of fit: 1980-1995
CAPNRS is the weighted average of PPICAP and IPDNRS

ATTACHMENT N

COBO COST DISTRIBUTION PER FCC REQUEST

COBO

P. 1 of 3

				ACOI			
				PRELIMINARY ENGINEERING - COBO			
				(Pre Construction)			
A	B	C	D	E	F		
				1996			
Work Group	Preparing Estimate	Travel Time	Total Time	Labor Rate	Total NRC		
	(hour)	(hour)	(hour)	(per hour)			
			B+C		D*E		
Collocation Coordinator	7	2.63	9.63	$53.69	$ 517.03		
OSP Engr.	9	0.75	9.75	$46.77	$ 456.01		
Power Engineer	8	1.5	9.5	$53.69	$ 510.06		
CSPEC	7	2.42	9.42	$53.69	$ 505.76		
DTE	9	2.75	11.75	$53.69	$ 630.86		
Real Estate*	10	2	12	$85.00	$ 1,020.00		
			Total NRC:		$ 3,639.72		
		*Additional Real Estate Costs					
Asbestos Assessment					$991.00		
			Weighting:				
	Assessment / 8 X 65%				$80.52		
	Assessment / 4 X 25%				$61.94		
	Assessment / 2 X 10%				$49.55		
		Total Asbestos Assessment:(D)			$192.01		
			Total Preliminary:		$ 3,831.73		

CONSTRUCTION PROVISIONING (2)

COMMON CONSTRUCTION (4)

P.2

			ACOI			
			PROJECT MGT. FEE - DESIGN FIRM ORDER (COBO)			
A	B	C	D	E	F	G
Work Group	Admin. Time (hr)	Engr. Time (hr)	Travel Time (hr)	Total Time B+C+E	Labor Rate (per hr)	Total NRC E*F
Collocation Coordinator	32	0	5.26	37.26	$53.69	$ 2,000.49
OSP Engr.	14	8	1.5	23.5	$46.77	$ 1,099.10
Power Engineer	14	6	3	23	$53.69	$ 1,234.87
CSPEC	18	0	4.84	22.84	$53.69	$ 1,226.28
DTE	14	8	5.5	27.5	$53.69	$ 1,476.48
Real Estate*	0	28	4	32	$85.00	$ 2,720.00
			Total NRC:			$ 9,757.22
			*Additional Real Estate COBO Costs			
Consulting Engineer						$1,000.00
Contracted Building Work Per 100SF (C)						$9,494.00
			Total Firm Order:			$ 20,251.22
			COBO COST SUMMARY			
Preliminary Engineering: (A)						$ 3,831.73
Design Firm Order: (B)						$ 20,251.22
		Total COBO Cost:(A+B)	(First 100 SF)			$24,082.95
		Additional 100 SF: (C+D)				$9,686.01

CONSTRUCTION PROVISIONING (2)

$3,822 INTERCONNECT SPECIFIC (3)

$4232 COMMON CO (4)

$2449 SECURITY (12)

FROM P.1

3,639.72 + 9757.22 = 13,396.94

2811

192.01 + 4232 + (191) 4415.01 ← ADJUSTMENT

3460

2 CONSTRUCTION PROVISIONING

3 INTERCONNECTOR SPECIFIC

4 COMMON CONST.

12 SECURITY

2 ϕ

3 $2,511

4 $4,015.01

12 $3,160

C

PROPRIETARY INFORMATION

CONTRACTED BUILDING WORK & CONSULTING ENGINEER

AMERITECH COLLOCATION PROJECT

COBO SUMMARY

Page Number	State	Area	# Sites Bldg. Ests.	# Sites COBO		COBO Estimates Arch.	Security	Elect.	Mech.	Other	Total	Remarks
1	Illinois	Chicago	11	17	Total	$44,375	$22,740	$19,525	$10,500	$7,500	$160,065	
					Average/Site	$4,034	$2,067	$1,775	$955	$682	$9,416	
2	Illinois	Metro	12	12	Total	$45,930	$21,315	$17,785	$14,985	$0	$100,015	
					Average/Site	$3,828	$1,776	$1,482	$1,249	$0	$8,335	
3	Illinois	Metro	5	5	Total	$20,525	$7,275	$9,200	$6,375	$0	$43,375	
					Average/Site	$4,105	$1,455	$1,840	$1,275	$0	$8,675	
	Illinois	Downstate	7	7	Total	$8,915	$15,030	$10,425	$16,025	$7,500	$57,895	
					Average/Site	$1,783	$3,006	$2,085	$3,205	$1,500	$8,271	
	Indiana		5	5	Total	$11,875	$7,400	$8,850	$25,800	$0	$53,925	
					Average/Site	$2,375	$1,480	$1,770	$5,160	$0	$10,785	
4	Michigan		24	25	Total	$64,391	$55,845	$41,235	$67,780	$2,375	$237,126	
					Average/Site	$2,683	$2,327	$1,718	$2,824	$99	$9,485	
5	Ohio	Cleveland	8	8	Total	$21,750	$12,525	$15,100	$35,500	$750	$85,625	
					Average/Site	$2,719	$1,566	$1,888	$4,438	$94	$10,703	
	Ohio	Columbus	7	7	Total	$18,500	$28,300	$14,350	$8,750	$0	$69,900	
					Average/Site	$2,643	$4,043	$2,050	$1,250	$0	$9,986	
	Wisconsin		6	6	Total	$21,500	$12,275	$11,550	$15,500	$0	$60,825	
					Average/Site	$3,583	$2,046	$1,925	$2,583	$0	$10,138	
					Grand Total	$257,761	$182,705	$148,020	$201,215	$18,125	$868,751	[redacted]
	Total Sites		85	92	COBO Averages	$3,032	$2,149	$1,741	$2,367	$213	$9,443	
											ENG'RING	
					CONSTRUCTION PROVISIONING					(Δ9)		
					INTERCONNECTOR SPECIFIC	1010		700	800		300	2811
					COMMON CONST	1011		1041	1567	213	400	4232